Self-Reported Health of Residents of the Mississippi Delta

The Lower Mississippi Delta Nutrition Intervention Research Consortium

Abstract: The rural Lower Mississippi Delta of Arkansas, Louisiana, and Mississippi has a large economically and socially disadvantaged population at high risk for health problems. Their health status is poorly understood as they are not well represented in national health surveys. A random-digit-dialing telephone survey was conducted in 2000, with 2,236 respondents representing residents of 36 counties along the Mississippi River. Self-reported chronic conditions, health status, and obesity (derived from weight and height) were compared with the nationally representative Continuing Survey of Food Intake of Individuals. High cholesterol, diabetes, and hypertension were significantly higher than in the national sample. Obesity was strikingly higher in Delta children (27.9% versus 16.2%) of all ages and in Delta adults (33.9% versus 17.3%). Controlling for age, income, and gender, African Americans were at particular risk for obesity, hypertension, and diabetes. A public health crisis appears to exist in the Delta given the high prevalence health problems.

Key words: Health status, obesity, high-risk population, hypertension, diabetes, Mississippi.

The last several decades have seen an increased interest in measuring and documenting the health status of the U.S. population. From a clinical perspective, health status measures are important to document the prevalence of serious health conditions, the need for health services, and outcomes of medical care. From a public health perspective, the measurement of the health status of populations, whether on a national, regional, state, or community level, may be used to identify social and economic correlates of health status[1] and to develop and evaluate community-based interventions to improve population health.[2]

The prevalence of chronic conditions such as cardiovascular disease, hypertension, diabetes, cancer, and obesity is often used as a measure of the health of a population. Because of the difficulty in identifying population-based sources of clinically measured morbidity, self-reported general health and functional status from national samples are increasingly used to assess mental and physical health status and disability and to document the prevalence of risk factors.[3,4] Self-reported health data may provide information not otherwise available, and often reliably predict loss of function, morbidity, and mortality.[5,6] Such data may be particularly useful for studying rural, underserved populations with limited access to health care. A meta-analysis of 27 community-based health studies concluded that self-rated health status contributes independently to mortality predictions and should be considered a valuable source of data on health status.[7]

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Monitoring the health and nutrition status of U.S. citizens has been the responsibility of two nationally representative surveys, the National Health and Nutrition Examination Survey (NHANES)[8] and the Continuing Survey of Food Intake of Individuals (CSFII).[9] NHANES collects medical, nutrition, and biological data in face-to-face interviews, and CSFII collects self-reported nutrition and health data by telephone. The Behavioral Risk Factor Surveillance System (BRFSS)[10] also collects self-reported health and risk factor data by telephone from a random sample of the population residing in participating states. However, because of sampling decisions and sample size limitations, these surveys cannot be used to accurately describe the health status of populations of specific regions across states. For example, in NHANES III, three counties in Florida and five counties in Texas represented the entire southern region of the United States.

Residents of rural areas are at greater risk than their nonrural counterparts for health problems and poor functional status.[11–13] Also, groups with lower education levels, lower income, and racial and ethnic minority status have more health risk factors than their counterparts and are at increased risk for health conditions, impairment in physical and mental functioning, and higher mortality rates than the non-Hispanic white population in the United States.[14–22]

The Lower Mississippi Delta region of Arkansas, Louisiana, and Mississippi is a predominantly rural area with high rates of poverty. The rural population is 69% in Mississippi, 55% in Arkansas, and 24% in Louisiana. The proportion of the population living in rural areas in the Delta counties is considerably higher.[23] One hundred percent of the residents of 15 of the 36 Delta counties in this survey lived in rural areas; 53–94% of the residents of the remaining 14 counties lived in rural areas.[24] The remaining 7 counties were between 17% and 44% rural. Arkansas, Louisiana, and Mississippi consistently rank among the five poorest and the least healthy states in the nation.[25,26]

The Lower Mississippi Delta Nutrition Intervention Research Initiative (Delta NIRI) was established to assess the nutrition and health status of the residents of the Delta and to develop and evaluate sustainable nutrition interventions. This consortium of six academic institutions in Arkansas, Louisiana, and Mississippi and the U.S. Department of Agriculture (USDA) Agricultural Research Service selected 36 Delta counties and parishes as the focus of research using two criteria: the counties must be contiguous to the Mississippi River and have at least 35% of the population living below the poverty level. This paper describes the self-reported health status of a representative sample of residents of these Delta counties collected in a random-digit-dialing telephone survey and compares it with national data collected in the CSFII. A higher prevalence of chronic health problems and lower physical and mental health functioning of those living in the Delta counties of Arkansas, Louisiana, and Mississippi than in the national sample was anticipated. However, the purpose of this survey was to provide baseline data describing the nutrition and health status of the Delta population. Objectives of this study were to compare Foods of Our Delta Survey (FOODS) 2000 data with national data from the CSFII 1994–1996 and 1998 surveys to determine the magnitude of health problems in the population in this region and to identify demographic groups who are at greatest risk.

Methods

FOODS 2000 was a cross-sectional telephone survey designed to provide a representative sample of the population 3 years of age and older in 36 Delta counties. A two-stage stratified cluster-sampling plan was used. In the first stage, 36 Delta counties were assigned to nine strata based on the proportion of residents who were urban, the proportion who were African American, and the proportion that were living below the poverty level. The mechanics of sample selection consisted of first selecting three counties from each stratum. Then, two of these counties were selected with probability proportional to size from each of the nine strata, providing 18 counties for the FOODS 2000 survey. List-assisted random-digit-dialing methodology was used to select a random sample of telephone numbers from the eligible working banks of telephone numbers in these 18 counties. A working bank consisted of the area code, three-digit exchange, and the first two digits of the remaining four digits. There are 100 possible numbers in each working bank.

A computer-assisted telephone interview was conducted to determine the eligibility of the household. An eligible household was one that had at least one member 18 years of age or older and whose telephone number was not solely for business use. During this recruitment interview, information on age, gender, race and ethnicity, and the presence of children in the household was determined. All members of the household were enumerated and one adult per household was selected randomly, using Kish's Tables.[27] Initially, one child was selected from single-child households and randomly selected from multiple-child households. During the recruitment stage, more households than expected had eligible children and the sampling rate for children was reduced slightly.

In the opening statements during the recruitment interview, potential respondents were told of the voluntary nature of participation in the survey and protection of their privacy, and that participation would not affect government benefits. A brochure was available for respondents who asked for additional information. The names of two contact persons were provided for respondents who had questions or concerns. The survey was reviewed by and received approval from the Institutional Review Board at each of the participating institutions.

Following the recruitment interview, a second telephone call was made to collect health and nutrition information. The two-part questionnaire that was used in FOODS 2000 included health and nutrition questions from the CSFII survey.[9] The first part of the interview used the CSFII multiple-pass methodology to collect dietary information.[9] In the second part of the interview, reported in this paper, adults and children were asked about height, weight, and whether they had been told by a health professional that they had any of the following health conditions: diabetes, hypertension, or high cholesterol. As in the CSFII, adults provided proxy interviews for children younger than 9 years of age and assisted children 9–11 years of age as necessary.

The SF-12 was used to measure overall physical and mental health status of adults.[4,28] Two summary SF-12 scores were calculated as complementary descriptions of overall health: the Physical Component Summary (PCS-12) and the Mental Component Summary (MC-12). The SF-12 Summary scales correlate well with

longer scales based on the SF-36.[28] The scales were coded, summed, and transformed linearly to a 0 (poorest health) to 100 (best health) range.

Every effort was made to maintain consistency between FOODS 2000 and CSFII methodology. For example, using self-reported weight and height, body mass index (BMI) was calculated as in CSFII. Guidelines published by the Centers for Disease Control and Prevention were used to classify subjects as obese or not. *Obesity* in adults was defined as BMI (weight/height^2) equal to or greater than 30.[29,30] *Overweight* in children was defined as BMI greater than the 95th percentile for age and gender.[29,31] In this study, *obesity* is used for overweight status in children.

Interviewers were trained to administer the telephone interviews during a 4-day training session using home study, demonstration interviews, interactive lectures, and role-playing techniques. All telephone interviews and training were conducted by Westat, the Delta NIRI Coordinating Center, in Rockville, MD, between January 10 and June 10, 2000.

Analysis. A household was eligible for FOODS 2000 if it had at least one household member 18 years of age and older. Because only one adult and at most one child were selected from each household, the probability of selection varied with the number of adults and children living in the household. Moreover, differential response rates may have resulted in over- or underrepresentation of certain subgroups in the respondent sample. Therefore, it was necessary to weight the data prior to producing statistics for analysis.

For FOODS 2000, the weighting was carried out in several steps. First, a household base weight was assigned to each sampled telephone number in each sampled county. The base weight is equal to the inverse of the selection probability of the county multiplied by the inverse of the selection probability of the telephone number. The second step in the weighting process was to make adjustments for telephone numbers with unknown residency or unknown eligibility or that were nonresponding households in the recruitment interview. The first part of these adjustments was to take the total weight assigned to the telephone numbers with unknown residency status and distribute it to those for which residency status was determined.

The eligibility of some sample households could not be established because the interviewer could not get a response. Among households with unknown eligibility status, at least some were likely to contain no household members who were eligible for the study. The purpose of the next part of the nonresponse adjustment was to distribute the weight of households for which eligibility was not ascertained. At this stage of the weighting process, only households with eligible persons and with telephones remained in the sample.

Some of these households refused to participate in the study. To compensate for nonparticipation, the weight of the nonparticipants was distributed to participants. The third step in the weighting process was to adjust household weights to account for the number of residential telephone lines in the household.

The product of each of these weighting factors constitutes the final household screener (recruitment interview) weight. The next stage of the weighting process was to produce person weights, because individuals are the primary unit of analysis. The within-household weighting factor for adults is simply the number of adults

in the household. For children, there were some households with children in which no children were sampled. Thus, the child weighting factor consisted of a factor to account for this subsampling of households and the number of children in a household.

The next step in the weighting process was to account for nonresponse of persons in the interview. The weight of nonrespondents was distributed to the participants within the adjustment cells and the nonresponse rates were calibrated to Census Bureau estimates. The final step in producing the weights for the interviews was to calibrate the trimmed weighted estimates to Census Bureau estimates by state, age, race, and gender.

Standard error adjustment factors were generated using WesVar[32] to account for the clustering effect within counties. The standard errors of the estimates generated by WesVar were then applied to the standard error adjustment factor calculated for each question. All of these weighting procedures were similar to those used in the CSFII and are standard in most national surveys.

The CSFII 1994–1996 and the CSFII 1998 public use data tapes were the primary sources of comparison data used in this study. The CSFII data were analyzed as a combined weighted sample. CSFII summary data were calculated using SUDAAN[33] with the appropriate jackknife type 2 weights.

Two types of statistical comparisons were performed, comparison of Delta subpopulations by demographic characteristics (gender, race, income, age) with corresponding groups in the CSFII national sample, and comparisons by demographic characteristics within the Delta. Comparisons of proportions for categorical variables were performed using either chi-square or Cochran-Mantel-Haenszel tests of associations, or a normal test of two proportions using the weighted variances. Comparisons to determine differences in means of continuous variables were calculated using *t*-tests or the corresponding normal approximation, with the standard error based on the weighted variances. To compare the SF-12 data from FOODS 2000 to nationally available SF-12 data, 95% confidence intervals (CI) were calculated.

Logistic regression models were used to examine simultaneously the additive effects of gender (male, female), age group (18–34, 35–44, 45–54, 55–64, 65–74, and ≥75 years), race (African American, white), household income ($0–$14,999, ≥$15,000), and weight status (calculated BMI) on each health condition. An additional outcome variable consisting of those who reported any of the four health conditions was used in the regression analysis. For each independent variable a reference level was selected: female, age 18–34 years, white, income of $15,000 or more, and normal weight. Odds ratios (OR) and 95% CI were then calculated based on the logistic regression model. SUDAAN version 7.5[33] and SAS version 8.0[34] were used for analyses.

Results

There were 9,113 telephone numbers selected for FOODS 2000. Of these, initial screening prior to data collection removed 2,066 nonresidential and nonworking numbers. During data collection an additional 2,670 numbers were identified as

nonresidential or nonworking and no one answered in 581 households. Of the remaining 3,796 households, 166 (4%) were not eligible (e.g., not in the Delta counties); 1,293 (34%) households refused to participate; and 175 (5%) households were unable to participate due to language or other problems. A total of 2,162 households agreed to participate for a screener interview response rate of 59%; the response rate to the subsequent interview was 80.3%. Thus, the overall response rate was 47.4% (0.59 x 0.803). There were 1,751 health interviews completed. This rate reflects the increasing difficulty in recruiting participants for scientific surveys, particularly among low-income and minority populations.[35]

Table 1 presents the demographic composition of the FOODS 2000 sample with the CSFII. Both samples were chosen to be representative of the population from which they were drawn. There is a higher proportion of African American and low-income households in the FOODS 2000 sample than in the CSFII. This is representative of the Delta, where 51% of the population in the 36 Delta counties is African American and 35% of the population is living below the poverty level.[24]

As anticipated, the overall prevalence of self-reported health conditions was higher in the Delta than in the national survey (Table 2). Respondents in the Delta were more likely to report that they had been told by a health professional that they had diabetes, high cholesterol levels, or hypertension. In the Delta, 10% of the population reported diabetes, almost twice the percentage found in the CSFII (5.6%). In FOODS 2000, one in three (33.2%) reported hypertension, compared with one in five (20%) in CSFII. The percentage of respondents who were obese was nearly twice as high in the Delta (33.9%) as in the nation (17.3%). All of these differences were statistically significant ($p < 0.001$)

Although the higher prevalence of chronic conditions overall in FOODS 2000 compared with the CSFII was expected, the magnitude of the problems in some population subgroups was not anticipated. In the older age groups, the prevalence of self-reported hypertension was approximately 60% compared with approximately 46% in the CSFII. Between 19.8% and 25.7% of persons 55–74 years of age in FOODS 2000 compared with between 10.7% and 15.7% in their counterparts in the CSFII reported that they had been told by a health professional that they had diabetes. The prevalence of hypertension among low-income Delta residents was 43.3%; it was 29.2% in the national survey. The prevalence of obesity in the Delta was particularly striking: 35.4 % of women, 38.8% of African Americans, and 35.3% of persons with higher incomes were obese.

Compared with their prevalence in the CSFII, the prevalence of self-reported hypertension and obesity was significantly higher in the Delta regardless of gender, race, household income, or age (see Table 2). The prevalence of diabetes also was significantly higher in the Delta for both men and women; African Americans and whites; for persons living in low-income households; and for persons between 35 and 74 years of age compared to CSFII respondents in the same categories. Self-reported high cholesterol was significantly higher in the Delta irrespective of gender, race, and household income, and for those over 65 years of age.

In the Delta population, the prevalence of diabetes and hypertension were significantly higher among women than men, African Americans than whites, and persons with incomes below $15,000 compared with persons with higher incomes.

Table 1.

DEMOGRAPHIC CHARACTERISTICS OF DELTA AND CSFII SAMPLES

Demographic characteristics	Children		Adults	
	Delta *n* (%)	CSFII *n* (%)	Delta *n* (%)	CSFII *n* (%)
Gender				
Male	231 (48)	3,940 (51)	655 (37)	5,198 (51)
Female	254 (52)	3,816 (49)	1,096 (63)	4,966 (49)
Race				
African American	265 (55)	1,162 (15)	857 (49)	1,150 (11)
White	203 (42)	4,859 (63)	842 (48)	7,739 (76)
Other	14 (3)	1,735 (22)	35 (2)	1,275 (13)
Unknown	3 (1)		17 (1)	
Household income ($)				
<15,000	106 (22)	1,515 (20)	497 (28)	2,249 (22)
≥15,000	310 (64)	6,241 (80)	1,048 (72)	7,915 (78)
Unknown	69 (14)		206 (12)	
Age (y)				
3–4	57 (12)	3,695 (48)		
5–8	117 (24)	2,076 (27)		
9–11	84 (17)	808 (10)		
12–17	227 (46)	1,177 (15)		
18–34			475 (27)	2,630 (26)
35–44			378 (22)	1,812 (18)
45–54			316 (18)	1,802 (18)
55–64			227 (13)	1,605 (16)
65–74			219 (13)	1,393 (14)
≥75			135 (8)	922 (9)
Total	485	7,756	1,751	10,164

Abbreviation: CSFII, Continuing Survey of Food Intake by Individuals 1994–1996.

Although the prevalence of obesity was high among all demographic groups in FOODS 2000, significant differences were noted only between African Americans and whites, with obesity more prevalent among African Americans. Higher cholesterol, on the other hand, was reported more often by whites than African Americans. All of these differences were statistically significant ($p < 0.001$).

On the self-rated general health status scale (SF-12), adults in FOODS 2000 scored significantly higher (better) on the mental component summary scale ($p < 0.001$) and lower (worse) on the physical component summary scale ($p < 0.001$) than adults in a national sample (data not shown). Respondents with lower incomes had

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Table 2.

SELF-REPORTED HEALTH CONDITIONS BY ADULTS IN THE DELTA AND THE CSFII

Demographic characteristics	Diabetes			High cholesterol			Hypertension			Obesity		
	Delta	CSFII	*p* value	Delta	CSFII	*p* value	Delta	CSFII	*p* value	Delta	CSFII	*p* value
Gender												
Male	8.7 (1.2)	5.4 (0.3)	<0.01	17.1 (1.4)	13.0 (0.6)	<0.01	28.9 (1.6)	19.5 (0.5)	<0.001	32.3 (2.1)	16.8 (0.6)	<0.001
Female	12.6 (0.9)	5.8 (0.4)	<0.001	18.0 (1.3)	14.9 (0.6)	<0.05	36.9 (1.6)	20.5 (0.6)	<0.001	35.4 (1.7)	18.5 (0.5)	<0.001
Race												
Afr. American	13.2 (1.3)	9.2 (1.1)	<0.05	13.6 (1.3)	9.4 (1.2)	<0.05	38.2 (1.9)	30.4 (1.9)	<0.01	38.8 (2.0)	28.5 (1.3)	<0.001
White	9.1 (1.1)	4.9 (0.3)	<0.001	21.2 (1.2)	15.8 (0.5)	<0.001	29.0 (1.6)	19.8 (0.6)	<0.001	29.9 (1.5)	16.5 (0.5)	<0.001
Household income ($)												
<15,000	14.6 (1.7)	10.9 (0.8)		20.4 (1.8)	14.6 (0.8)	<0.01	43.3 (2.6)	29.2 (1.0)	<0.001	33.6 (2.6)	22.1 (1.1)	<0.001
≥15,000	9.0 (0.8)	4.7 (0.3)	<0.001	17.5 (0.9)	13.9 (0.5)	<0.001	28.4 (1.5)	18.4 (0.5)	<0.001	35.3 (1.6)	16.9 (0.5)	<0.001
Age (y)												
18–34	2.5 (0.6)	1.7 (0.3)		4.9 (1.2)	3.6 (0.4)		12.6 (1.5)	5.1 (0.5)	<0.001	30.7 (2.3)	12.8 (0,8)	<0.001
35–44	6.5 (1.3)	2.2 (0.4)	<0.01	11.7 (2.0)	9.2 (1.1)		26.8 (2.4)	12.3 (0.9)	<0.001	37.0 (3.1)	19.3 (1.1)	<0.001
45–54	12.5 (2.1)	5.5 (0.6)	<0.01	18.0 (2.2)	18.6 (1.0)		35.1 (3.0)	23.3 (1.0)	<0.001	42.2 (3.6)	21.8 (1.2)	<0.001
55–64	19.8 (2.6)	10.7 (0.7)	<0.01	32.5 (2.9)	29.4(1.4)		55.0 (4.2)	37.1 (1.7)	<0.001	39.5 (3.7)	21.9 (1.2)	<0.001
65–74	25.7 (3.3)	15.7 (1.1)	<0.01	40.3 (3.9)	30.9 (1.3)	<0.05	60.9 (3.4)	46.5 (1.3)	<0.001	24.5 (3.0)	18.4 (0.9)	<0.05
≥75	18.3 (4.7)	14.2 (1.2)		32.0 (4.6)	21.9 (1.5)	<0.05	59.5 (5.7)	46.6 (1.8)	<0.05	18.1 (3.2)	13.3 (1.4)	
Total	10.8 (0.7)	5.6 (0.3)	<0.001	17.6 (0.9)	14.0 (0.4)	<0.001	33.2 (1.2)	20.0 (0.5)	<0.001	33.9 (1.3)	17.3 (0.4)	<0.001

Note: Data are presented as percent (standard error).
Abbreviation: CSFII, Continuing Survey of Food Intake by Individuals 1994–1996, 1998.

the lowest scores on both scales ($p < 0.001$). Women scored lower than men on both scales ($p < 0.01$), as did African Americans compared with whites ($p < 0.001$). Consistent with national data, self-reported physical health decreased with age in the Delta.

The prevalence of obesity in FOODS 2000 and the CSFII surveys for African American and white adults 20–70 years of age is shown in Figure 1. The differences between the two surveys are striking across the age span with increasing prevalence in both surveys until 65 years of age when there is a decline among both African Americans and whites, although the prevalence in African Americans in both surveys is higher than whites at all ages.

Compared with CSFII, the overall prevalence of obesity in the Delta children (27.9%) was significantly higher than in the national sample (16.2%, $p < 0.001$; Table 3). These higher obesity rates for Delta children were statistically significant for most demographic groups except for African American children and for children 3–4 years of age.

The results of the logistic regression analysis of self-reported diabetes, high cholesterol, hypertension, obesity, and a health summary measure of those persons who reported any one of these four health problems are presented in Table 4. The risk of diabetes, high cholesterol, hypertension, and reporting having any health condition (diabetes, high cholesterol, or hypertension) increased with age, peaking at 65–74 years of age. The risk of obesity was higher for persons 35–64 years of age than for those who were 18–34 years of age.

After allowing for age, gender, race, income, and adult weight status in the model, the risk of diabetes in African Americans was nearly twice that in whites (OR 1.7; CI 1.1– 2.6). The risk of diabetes was greater in persons who were overweight or obese (OR 1.9; CI 1.2–3.0 and OR 2.9; CI 1.8–4.7, respectively) compared with respondents with normal weight. The risk of hypertension also was higher in African American (OR 1.9; CI 1.4–2.6), low income (OR 1.5; CI 1.1–2.1), overweight (OR 1.6; CI 1.1–2.4), or obese (OR 3.3, CI 2.3–4.6) individuals. When obesity was used as the outcome variable in the regression model, the adjusted OR (1.7; CI 1.3–2.2) was higher for African Americans than for whites. The odds ratios associated with diabetes, hypertension and high cholesterol increased with age, peaking in those in the 65–74 years of age.

Discussion

The Lower Mississippi Delta region of Arkansas, Mississippi, and Louisiana is one of the most impoverished regions in the United States. With the well-known association between poverty and mortality, morbidity, and chronic disease, and given the rurality of this region, we anticipated a higher number of self-reported health problems in this population than in national samples. In the adult Delta population, there were striking differences in comparison with the national sample, with significantly more obesity, hypertension, diabetes, and high cholesterol reported. These higher prevalences were found in most demographic subpopulations. Self-reported obesity in the Delta population was almost twice that in the national sample (33.9% compared with 17.3%). The prevalence of obesity

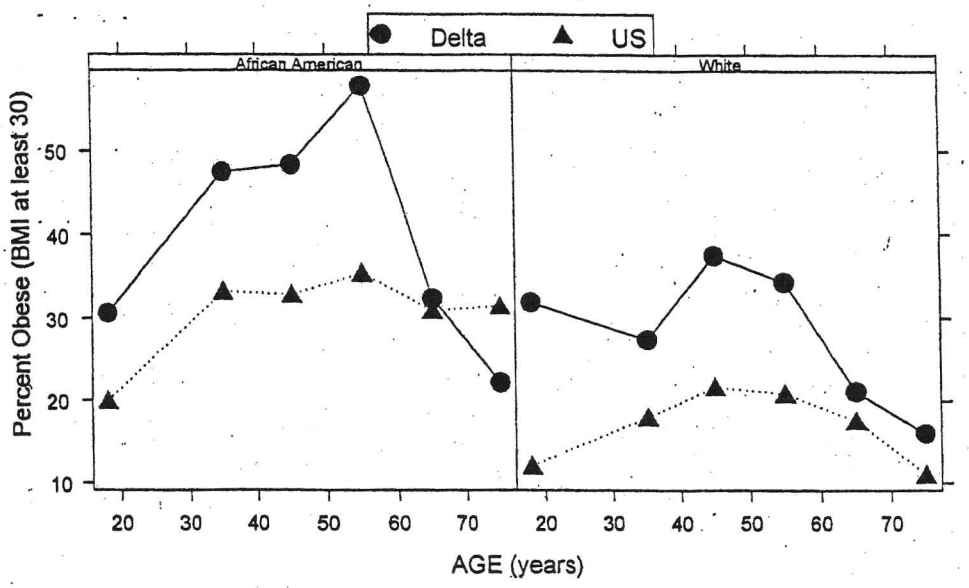

Figure 1. Estimates of obesity by race and age for the Lower Mississippi Delta and the United States. (U.S. data from the Continuing Survey of Food Intakes by Individuals [CSFII], 1994–1996, 1998.)

Table 3.

OBESITY IN CHILDREN IN THE DELTA AND CSFII[a]

Demographic characteristics	Delta	CSFII	*P* value
Gender			
Male	29.8 (3.4)	18.3 (0.9)	<0.010
Female	26.0 (3.1)	14.0 (1.0)	<0.001
Race			
African American	26.9 (3.2)	22.6 (1.8)	
White	27.6 (3.6)	14.6 (0.7)	<0.001
Household income			
<$15,000	33.9 (5.8)	20.7 (1.6)	<0.050
≥$15,000	26.3 (2.9)	15.3 (0.7)	<0.001
Age (y)			
3–4	37.4 (7.6)	31.2 (1.3)	
5–8	41.5 (4.7)	20.8 (1.3)	<0.001
9–11	23.1 (5.6)	11.2 (1.6)	<0.050
12–17	17.5 (2.9)	10.3 (0.7)	<0.050
Total	27.9 (2.4)	16.2 (0.7)	<0.001

[a]Data are presented as percent (standard error). Obesity is defined as BMI >95th percentile for age and gender.
Abbreviations: BMI, body mass index; CSFII, Continuing Survey of Food Intake by Individuals 1994–1996.

Table 4.

LOGISTIC REGRESSION ANALYSIS OF SELF-REPORTED HEALTH CONDITIONS BY DEMOGRAPHIC CHARACTERISTICS FOR ADULTS IN THE DELTA

Demographic characteristics	Diabetes OR (95% CI)	High cholesterol OR (95% CI)	Hypertension OR (95% CI)	Obesity OR (95% CI)	Any health condition[a] OR (95% CI)
Gender					
Male	0.8 (0.5–1.2)	1.2 (0.8–1.6)	0.8 (.06–1.0)	0.9 (0.7–1.2)	0.8 (0.6–1.1)
Female	1	1	1	1	1
Race					
White	1	1	1	1	1
African American	1.7 (1.1–2.6)	0.7 (0.5–0.95)	1.9 (1.4–2.6)	1.7 (1.3–2.2)	1.3 (0.9–1.8)
Household income					
<$15,000	1.3 (0.9–2.0)	1.2 (0.9–1.7)	1.5 (1.1–2.1)	0.9 (0.7–1.1)	1.4 (1.1–1.9)
≥$15,000	1	1	1	1	1
Age (y)					
18–34	1	1	1	1	1
35–44	2.6 (1.2–5.6)	2.4 (1.3–4.7)	2.7 (1.8–4.1)	1.3 (0.9–1.9)	2.0 (1.7–3.6)
45–54	4.7 (2.0–10.9)	3.9 (2.1–7.5)	3.3 (2.1–5.3)	1.7 (1.1–2.6)	3.2 (2.1–4.8)
55–64	11.2 (5.4–23.5)	7.8 (4.1–14.9)	10.6 (6.6–17.3)	1.6 (1.0–2.4)	13.9 (9.1–21.2)
65–74	16.1 (7.7–33.9)	11.7 (5.9–23.4)	11.1 (6.8–18.0)	0.8 (0.5–1.2)	15.3 (9.6–24.4)
≥75	11.4 (3.7–34.7)	10.1 (5.1–20.0)	9.5 (5.1–17.8)	0.6 (0.3–1.0)	14.4 (6.9–30.1)
Adult weight status					
Normal	1	1	1		1
Overweight	1.9 (1.2–3.0)	1.2 (0.8–1.8)	1.6 (1.1–2.4)		1.4 (1.0–2.0)
Obese	2.9 (1.8–4.7)	1.5 (0.9–2.3)	3.3 (2.3–4.6)		3.0 (2.2–4.1)

Abbreviations: OR, odds ratio; CI, confidence interval.
[a] Diabetes, high cholesterol, or hypertension.

and diabetes in the Delta is higher than those in the 2000 BRFSS and the 1999–2000 NHANES, although the prevalence of both continues to increase.[36,37] State-level BRFSS data (2001) revealed a lower prevalence of obesity in Arkansas (21.7%), Louisiana (23.3%), and Mississippi (25.9%) than we found in the Delta counties of these states in 2000.[38]

When controlling for age, income, and gender in multivariate models, being African American was a significant predictor of obesity. The association of obesity with race/ethnicity has been reported previously in NHANES and the BRFSS.[39,40] Other than age, the strongest predictors of self-reported diabetes and hypertension were being overweight or obese, or being African American. The association between race/ethnicity and diabetes and hypertension also has been demonstrated in national surveys.[12,19–21,36,41] Although family income was associated with diabetes and hypertension, income was independently associated only with hypertension in the logistic regression. Incomes of less than $15,000 were more prevalent in African Americans than Caucasians (over 40% versus over 15%, respectively) in this Delta sample. This confounding likely accounts for the nonsignificant association between income with diabetes, high cholesterol, and obesity in models controlled for race. It is also possible that our measure of household income (only two categories) was too broad to adequately estimate the association of income with chronic disease.

Adults in the Delta population scored worse on self-reported general physical health summary scale and higher on the mental health summary scale than the reference sample. The most striking differences among Delta residents were between income categories; the lowest physical and mental health scores were found for those with the lowest incomes. Lower self-rated health in lower-income families has been found in the BRFSS and other studies.[17,18,42] Using the same or related subjective instruments as used in FOODS 2000, rural and urban low-income mothers in Ohio and African Americans in a large clinical sample reported lower physical and lower mental health status.[15,16] The results from FOODS 2000 are consistent with other epidemiologic studies that have shown that residents of rural areas may report better mental health status than their nonrural counterparts, with less anxiety, depression, and comorbidity.[43–45]

Like adults, children in FOODS 2000 demonstrated higher rates of obesity when compared with the CSFII. The higher rates of obesity persisted across the age span and within almost every demographic subcategory, with the highest prevalence among the poorest children, and in early school years. There was no difference in the prevalence of obesity between African American and white children in the Delta. Almost 28% of the Delta children were obese. This prevalence is higher than the most recent NHANES (15% for children age 6–19 years),[46] the Youth Risk Behavior Surveillance (9.9%),[47] a low-income multi-ethnic group of school children (20%),[48] the National Longitudinal Survey of Youth (African American 21.8%, white 12.3%),[49] and a low-income adolescent Mexican American group (22%).[50] The Delta prevalence of childhood obesity is exceeded only by its prevalence among native children in Northern Canada, reported at 40% for women and 34% for men.[51] As with adults, the most recent NHANES data demonstrate an upward national trend in child and adolescent obesity,[37] but these figures are lower than the figures for the

Delta. The prevalence of other chronic conditions in the children in the Delta sample was insufficient to reliably compare with a national sample.

Strengths and weaknesses of our research should be considered. Telephone surveys often are used to gather population-based data. This method provides the ability to collect data rapidly and at substantially lower cost than in-person interviews. These advantages are particularly important in rural areas were population density is low. There are several limitations to telephone surveys. Two of the most frequently expressed concerns are the biases resulting from noncoverage and nonresponse.[52] Noncoverage bias may result from the exclusion of the non-telephone households. Because telephone ownership is so widespread (between 93% and 95% of U.S. households) differences are small between the total population and those that have telephones.[53] Anderson notes that data from telephone surveys are acceptable for public health issues. Even when comparisons were made for persons below the poverty level, the differences in reported health status were very small.[53] However, non-telephone households may be of lower socioeconomic status and may be more likely to have health problems than households with telephones. It is possible that the poorest families may not have had telephones and were thus not available for interview. It is also possible that the Delta sample has less access to medical care and that respondents were not aware of existing health problems. All of these circumstances could mean that our results underestimate the prevalence of the conditions studied in this survey.

To address this concern in the Delta population, we conducted a validation study to evaluate the possibility of differential reporting of health and nutrition data in telephone and non-telephone households.[54] In-person and telephone interviews were conducted in households with telephones or without telephones in three counties in Arkansas, Louisiana, and Mississippi. Cell phones were provided for respondents in the non-telephone households. No statistically significant differences were found in reported health status or food intake in the four household types (with or without telephones; face-to-face or telephone interviews in both telephone and non-telephone households), reported food intake, or health status. In addition, several other reports support the validity of telephone survey in collecting nutrition and health data.[55–57]

Self-reported morbidity has been found valid even in high-risk populations.[58] Although overweight subjects have previously been found to underreport weight and overestimate height (which would result in underreporting of obesity)[59] a recent report of teens demonstrated 96% accuracy of obesity status based on self-reported weight and height.[60]

The second limitation is the low overall response rate (47.4%), which raises concerns about validity. Telephone surveys generally have a lower response rate than household surveys.[56] The effects of the low response rates are difficult to evaluate because no information is available on the nonrespondents in FOODS 2000. The data collected in FOODS 2000 was weighted to adjust for nonresponse at several levels. Data were adjusted for telephone numbers with unknown eligibility, and unknown residency or nonresponse to the recruitment interview and for refusal to participate. The data also were weighted to account for bias associated with

nonresponse of persons in the interview. The goal of the weighting process was to reduce the bias associated with noncoverage and nonresponse issues. Nevertheless, with complete self-reported health data available for slightly less than half of the targeted sample, the validity of some results may be called into question.

Finally, most comparative data were collected in years previous to our collection in 2000. Secular trends toward more health problems have occurred in that interval. On the other hand, widely accepted standard sampling and weighting techniques were used to identify a random sample of households that are representative of the Delta region. We used questions that were piloted and refined to ensure high quality and comparability to national survey data. We used the same research organization, Westat, which used the same high-quality monitoring and quality controls as used in the national CSFII survey.

What factors might explain the high prevalence of chronic disease and poor health in the Delta sample?[61,62] Lower socioeconomic and minority race/ethnicity status are well known correlates of poor physical and mental health status and increased prevalence of chronic disease. The Delta sample, which is representative of the Delta population, has more African American and lower-income families than the national surveys. However, these unique demographic characteristics do not fully explain why virtually all demographic subgroups in the Delta had higher prevalence of chronic disease than their counterparts in the national sample. Poor diet quality and unhealthy food preparation, perhaps related to cultural traditions, are likely related to the higher prevalence of health conditions. We will be performing analyses to evaluate these relationships. Other possible explanatory factors include lifestyle issues such as smoking and sedentary behavior; genetic predisposition; poor access to medical care, including preventive care, due to isolation or lack of insurance; life stressors associated with poverty including neighborhood of residence; and possibly other unknown personal and environmental psychosocial factors.[14,63,64]

In summary, the health status of residents of the Delta of Arkansas, Mississippi, and Louisiana is significantly worse than the national population, even when compared with similar demographic groups. A public health crisis appears to exist in the Delta region, given the high prevalence of obesity, hypertension, and diabetes. Because the prevalence of these disorders appears to be increasing in national samples, a parallel continued increase in the Delta can be anticipated unless action is taken. The information available from this study should be useful in developing broad-based health and nutrition interventions at the community level focused on these issues with action plans to identify the factors leading to these problems.[63] Other regions in the United States with similar demographic and health characteristics also could be identified for similar intervention.

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Consortium are to evaluate nutritional health of Lower Delta residents and to design and evaluate interventions to address nutritional problems; the community goal of the Consortium is to assist communities to develop the infrastructure to monitor and sustain nutritional interventions.

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The Consortium's Writing Group consists of these individuals: Patrick Casey, MD (Chair), Jacqueline Horton, ScD, Margaret Bogle, PhD, RD, Betty Fomby, PhD, RN, William Forsythe, PhD, Susan Goolsby, MS, RD, Jeffrey Gossett, MS, Edith Hyman, PhD, Tim Kramer, PhD, Jennifer Lovejoy, PhD, Mattie Rasco, MS, RD, James M. Robbins, PhD, Wanda Simon, MS, and Pippa Simpson, PhD.

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